

# A Model of United States Inflation, 1959-80

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Numerous studies have investigated the influence of money on prices by regressing the inflation rate on a distributed lag of money stock growth rates. These investigations have usually obtained lags between money and prices of 10 to 20 quarters. This research has been useful, yet it seems important conceptually to relate price behavior to both the supply and demand side of a market.

In the approach of this study, the price level growth rate is the result of an interaction between money supply and money demand growth rates. In the regression equations used to test the model, the annual inflation rate is assumed to be a function of two independent variables: the annual rate of change of the monetary base and the annual rate of change of real GNP, i.e.,  $\dot{P} = f(\dot{B}, \dot{Y})$ . If variations in the money supply multiplier are substantial, the use of the monetary base in place of the money stock will weaken the predictive power of the model. The same holds true of the use of real GNP as a proxy for money demand; if variations in the Cambridge  $k$  (ratio of nominal money demand to nominal income) are substantial, the predictive power of the model will be weakened.

In the estimation of  $\dot{P} = f(\dot{B}, \dot{Y})$ , the annual rate of change of the money multiplier and the Cambridge  $k$  appear in the constant term and/or the random error term. Hence, the explanatory power of the money multiplier and the

Cambridge  $k$  is quantified as  $1 - r^2$ . In effect, the authors' model tests whether variation in the money multiplier and the Cambridge  $k$  are a source of inflation, after accounting for variations in the monetary base and real income.

An annual OLS regression gives the following results:

$$\dot{P}_t = .989 + .943\dot{B}_t - .588\dot{Y}_t \\ (1.54) (10.83) (6.98)$$

$$R^2 = .902 \quad F\text{-ratio} = 82.83 \quad Dw = 1.70 \quad S.E. = .884$$

Figures in parentheses below the (elasticity) coefficients are  $t$ -values. The results with a one-year lagged base variable are:

$$\dot{P}_t = .109 + .715\dot{B}_t + .330\dot{B}_{t-1} - .510\dot{Y}_t \\ (0.16) (3.57) (1.90) (6.53)$$

$$R^2 = .931 \quad F\text{-ratio} = 71.99 \quad DW = 1.74 \quad S.E. = .759$$

The elasticity of the price level to the monetary base level is approximately one, while the elasticity of the price level to the real GNP level is approximately a negative one-half. The adjustment of the price level to monetary base occurs within two years, and the adjustment of the price level to the real GNP occurs within one year. The authors found that the annual growth rate of real GNP was not statistically related to the annual growth rate of the monetary base.